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ABSTRACT

Two recent conferences on the science of sport have focused on the topic of sports for older people. Investigations have been made on the special demand in motor learning, in table-tennis, family-tennis, gymnastics, and dancing. This paper summarizes some experiences and conclusions drawn from these studies, including special notes on isolated dimensions of motor learning ability at a higher age. In the first part, some basic knowledge on motor learning abilities at higher age are outlined. The second part gives some first results of studies on motor learning and aging. (JD)

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Motor Learning and aging

Preliminary remarks

At the University of Erlangen-Nuremberg two conferences in the science of sport have taken place during the last three years, concerning sports for older people. In this period we have made an investigation on the special demand in motor learning, in table-tennis, family-tennis, gymnastics and dancing.

The following paper summarizes some experiences and conclusions drawn from these studies, including special notes on isolated dimensions of motor learning ability at a higher age.

In the first part some basic knowledge on motor learning abilities at higher age are outlined. The second part gives some first results of our studies on motor learning and aging.

1. Age-related changes in motor learning abilities

The following keynotes should be set ahead:

1. Development is a lifelong process. Development is determined by learning, including motor learning. Human development is dependent on stimulating environmental factors. These factors are created by situative demands to use the possibilities of development. In the field of sports, such factors are represented in different ways.

2. The ability to learn remains all one's life with restrictions concerning motor learning ability.

1.1 "Aging" and "Human development"

1.1.1 Aging

There are several ways to classify stages of age. It depends on the special point of view one has, whether you think of the lifespan, corresponding with calendar or chronological age or the biological age. In sports competitions, human performance in a special field is a main criterion to classify stages of age. Depending on types of sport, it is possible to belong to an aged class in sport prior to 30 years. Regarding motor learning ability, the so-called functional age is a very important concept. It takes into consideration changes in the biological, the psychological, as well as in the social field. In reference to a classification of the World Health Organisation and in accordance with the funtional age-concept, 45 years could be considered as the lowest limit of beginning age. In accordance with the

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WHO, intensive changes in mechanisms of regulation can be observed between 45 and 60 years. The beginning of middle age corresponds with a decreasing ability of performance, but considerable delays are possible.

1.1.2 Learning by acting - a very important dimension in human development

Human development is a lifelong permanent process. It is based on the relationship between a person and his/her environmental conditions. Human development is based on the relationship of the human being with his/her material and personal surroundings. A certain movement behavior is the result of learning processes, especially motor learning processes. This is realized by the perception of external conditioning factors, based on the internal conditions of a person. Direction and speed of developmental processes are influenced by genetic factors and by the arranging of environmental situations. Motor learning ability is highly dependent on the existing extent of distinct personal characteristics. Some of these are early decreasing, e.g. characteristics concerning motor strength and speed. There are other characteristics that can be preserved by special kinds of training up to a high age, for instance certain dimensions of motor endurance.

On the other hand, there are performance components on the cognitive level that can be improved by special mental training even at a higher age. In order to influence human perception and movement by means of sports, it is necessary to take care of the particularities of the motor learning ability of adults, beginning at the above mentioned stage and the following ones.

1.2 Dimensions of motor learning and their changes due to aging

1.2.1 Modification of the motivational structure

Results of special investigations show that the motivational structure changes during a lifespan in the meaning of shifts of importance of distinct motives. Strategies to motivate aged people can only be successful when those motives that are meaningful, are activated. Motives related to performance or desire to dominate, for example, are not meaningful anymore for the majority of older people - though there are exceptions to be noted with regard to an increasing number of older sportsmen. (such as triatlon). In general, other motives dominate, for example pleasure, fitness, health and social contacts.

1.2.2 Ability of adaptation

Generally speaking, the ability to adapt is decreasing. That means the ability of the organism to adapt to internal and external demands. It is the main criteriom for the so-called and above-mentioned biological age, in connection with vitality. Changes in the ability of adaptation are manifested in several regions of personality. This will be shown in the following chapters.

1.2.2.1 Cognitive/perceptual domain

Research in gerontology/gerontopsychology outlines a decreasing tendency of differentiation of psychological functions. So-called power-related components of cognitive performance can be stabilized up to an old age. These are intellectual functions that depend on training. They are independent of cognitive speed, are related to educational systems and environmental influences.

So-called speed-performances in cognition begin to decrease approximately at the age of 30. These performances are components characterized by stressing the speed of solving problems. The association of these functions with environmental conditions is less important. They seem to be closely related to genetic factors. In a general sense we can characterize these functions as the capability to assimilating information. That means that the capability of assuming und assimilating information simultaneously decreases.

1.2.2.2 Coordinative/conditional region

It is remarkable that there is a lack of investigations concerning coordination of movement in aged people. These conclusions concerning age-related changes in the capability of coordination can only be drawn on a feeble basis. The following statements should be understood as help for orientation:

The capability of coordination generally decreases with advancing years. This is connected with a prolonged time to answer, concerning audio-, visual- and somato-sensorical stimuli. Weariness of muscles begins earlier and time for recovery is prolonged. A remarkable reduction of movement control can be noticed, especially concerning movements with precise realisation. Beyond that, a decrease can be stated in the ability to balance.

1.2.2.3 Social/emotional region

Social relationships are often related to professional roles. This holds for the middle and later age of adults. In the late adulthood, critical changes can be observed in social behavior, often related to retirement and the loss of social contacts.

2. Conclusions for the demands concerning sports programs for older people

Based on the above-mentioned changes in the conditions for motor learning, four main objectives in sport with older people are derived:

a) Preserving, stabilizing, reactivating of sensory capabilities
b) coordination with time limitation (adaptation to rhythm)
c) controlling movements (precise realisation)
d) social behavior.

These objectives belong to the complex ability of integrating information.

3. Planning and realizing an investigation (survey)

The following investigations were carried out, using table-tennis, family-tennis, gymnastics and dancing as sport treatments.

3.1 Objectives

1) Testing methods of instruction
2) Evaluation of dimensions of motor learning ability by
   - coordination of movement (time limitation)
   - control of movement (precision of realisation)

3.2 Conditions of investigation

The conditions of investigation were identical in each of the four types of sports. The age of the subjects was between 58 and 83 years, their experiences in sports were different. This investigation took 13 weeks with one treatment unit per week (60 minutes), including tests.

design:

Tests	T1					T2					T3		
Week	1	2	3	4	5	6	7	8	9	10	11	12	13
groups													
A													
B													
C													
D													

A = table-tennis; B = familiy-tennis; C = gymnastics; D = dancing;
T = test

3.3 Conception of instruction programs - main criteria

It would be too detailed to explain the learning programs. So I prefer to talk about the main criteria that were taken into account.

As the complex ability of assimilating speed-oriented information decreases as time goes on, the demand for that ability was systematically increased in the movement programs. With regard to the special movements in the four types of sport, it was not possible to realize this in each case in the same way.

To plan movement programs, the following criteria were taken into consideration:

a) Increasing the number and changes of information in a fixed time schedule.
   For example: table-tennis: systematic change of direction and speed of the flying ball. (sensory ability of differentiation and orientation, reaction time, ability to adapt).
b) Addition of combining parts of movements in a systematical way (arms, legs).
c) Shortening of the time to realize movements (ability to adapt). For example, table-tennis: the time to realize a movement to return a ball is determined by the speed of the flying ball.
d) Precise realization of movement (control of movement) (for example table-tennis: the accuracy of striking a ball)
   Combining coordination of movement with time limit and controlling of movement is not without problems. Controlling movements must take into consideration the so-called personal tempo. The above-mentioned criteria were included in movement programs. For example, they will be shown in gymnastics. The information was given directly by an instructor who demonstrated a movement or indirectly by video.

gymnastics

- a single movement was to be executed by one part of the body.
- symmetrical combining of two movements by parts of the body (e.g.: left and right hand).
- combination of movements by two parts of the body, including an object (e,g.: left arm, left hand and a ball)
- assymetrical combining of movements by two parts of the body
- combination of three movements by parts of the body
- combining movements by two parts of the body, regarding different factors like music, apparatus, partner, group.

3.4 Methods of measurement

There were some methods developed in order to measure the specific coordination of movement in different types of sport, regarding qualitative and quantitative aspects. Our special interest was directed towards the

a) realization of movements in a fixed time schedule to measure the senso-motor ability of adaptation with regard to different conditions.
b) realization of movements without a time schedule. In this case the main point of view was the adaptation to a constant external stimulus (precision and constancy of movement).

The following example is taken from table-tennis:

- Based on constantly following stimulus by a robot, the accuracy of movement was measured. 50 balls were played by a robot to a special point on the table-tennis table. They were to be returned by a special stroke into an indicated field on the table. The result was made precise by numerical data.

- The precision of movement was measured based on a varied range of stimulus (ability to adapt). 50 balls were directed at a person by a robot within a time schedule. The direction of the ball varied unsystematically.

4. Results/experiences

The purpose of this study can be summarized in three points:

1. Experience had to be gained concerning the possibilities of learning movements at a higher age.
2. By trying out certain methods of teaching, concerning special aims of activity in sports at a higher age, the particularities of teaching methods were to be disclosed.
3. Experience had to be made as to how to measure special abilities of coordination in connection with special dimensions of motor learning abilities.

The results have to be regarded as first steps towards gathering experience in this field of research.

As the groups were heterogeneous in age, ability and socialization, we were not that much interested in numerical data. So the results I talked about are mainly based on a higher number of studies of individual cases.

Ad 1: it was evident in each of our studies in several types of sport, that movements can be learned even beyond the eighties and this without having played table-tennis or family-tennis before.

Ad 2: in general the methods of teaching were regarded as useful by the experimental groups. They only said the time for training movements was too short.

Ad 3: The problem of measuring the ability of coordination in the above-mentioned programs is only partly solved. As to objectivity, reliability and validation of measurement, the main problem lies in the internal validation because of the variety of factors that are to be measured, or respectively, to be controlled.

5. Conclusion

The topic 'sport with the elderly' has been a neglected field in sport sciences up to now, especially in sports pedagogics and -didactics. Actually, the main issues have not changed. They are:
- the finding out of profiles of abilities at a higher age, concerning the learning of movements
- the sport-specific aims
- the particularities of teaching methods in sports with older people

References

Baumann, H. (Ed.) (1988), Älter werden - Fit bleiben. Ahrensburg: Czwalina.

Bergener, M. Ermini, M. Stähelin, H. B. (Ed.), (1988), crossroads in aging. London, San Diego, New York, Berkeley, Boston, Sydney, Tokyo, Toronto: Academic Press.

Lehr, U. (1984), Psychologie des Alterns. 5. Aufl. Heidelberg: UTB.

Meusel, H. (1988), Sport ab 40. Reinbek bei Hamburg: Rowohlt.

Oswald, W.D. et.al. (Ed.), (1984), Gerontologie. Stuttgart, Berlin, Köln, Mainz: Kohlhammer.